

Ultra Compact Laser for 3D Imaging LIDAR, Phase II

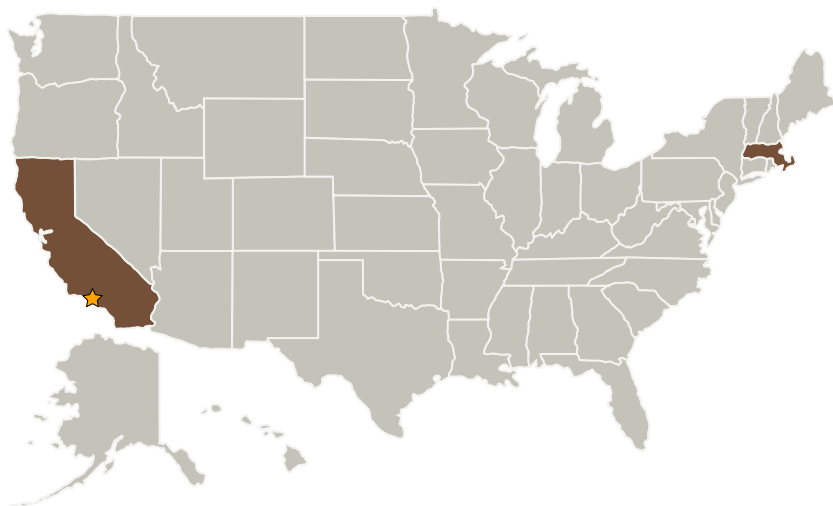
Completed Technology Project (2017 - 2019)



Project Introduction

In response to NASA's solicitation for light-weight, power-efficient and radiation-hardened instruments that enable robotic exploration of the Solar System, especially Europa, Q Peak in partnership with Sigma Space proposes to develop a compact and robust LiDAR instrument to assist in the landing/sampling site selection process. Q-Peak's low SWaP and higher energy laser will extend the dynamic range of Sigma Space's LiDAR instrument to > 10 km. For NASA JPL, Sigma Space completed a design study of potential LiDAR solutions for a lander. It was concluded that the challenging LiDAR requirements could be met with a laser of about 1W average power, using short pulses in the green at a PRF of ~30 kHz. The biggest challenge to this application is the limited mass and the high radiation environment. Q-Peak proposes to develop a 1-W laser that has a volume < 8 c.c and a weight < 20 g. The SWaP is at least an order of magnitude lower compared to the commercially available laser source. The modular form factor allows the laser to be easily modified to produce different wavelengths by frequency up conversion. The ultra-compact laser along with the single photon LiDAR will find direct and immediate application on at least two more NASA missions - Restore-L and ARRMM. Restore-L is an ambitious endeavor to launch a robotic spacecraft in 2020 to refuel a live satellite in low-Earth orbit and demonstrate a suite of satellite-servicing technologies, potentially including a satellite laser rangefinder using the same laser. The Asteroid Redirect Robotic Mission (ARRM) is designed to send astronauts to visit a large near-Earth asteroid, explore it and return with samples in the 2020s. This is part of NASA's plan to advance new technologies and spaceflight experience in preparation for a human mission to the Martian system in the 2030s.

Primary U.S. Work Locations and Key Partners



Ultra Compact Laser for 3D Imaging LIDAR, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Target Destinations	3

Ultra Compact Laser for 3D Imaging LIDAR, Phase II

Completed Technology Project (2017 - 2019)



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Q-Peak, Inc.	Supporting Organization	Industry	Bedford, Massachusetts

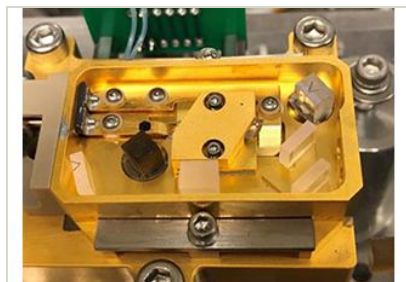
Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

**April 2017:** Project Start**October 2019:** Closed out**Closeout Summary:** 1574104318073.pdf**Closeout Documentation:**

- Final Summary Chart PDF(<https://techport.nasa.gov/file/137341>)

Images

**Final Summary Chart Image**

1574104140433.jpg

(<https://techport.nasa.gov/image/131774>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Carol R Lewis

Principal Investigator:

Bhabana Pati

Co-Investigator:

Thomas A Lynch

Ultra Compact Laser for 3D Imaging LIDAR, Phase II

Completed Technology Project (2017 - 2019)



Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System